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LOUIS POPE GRATACAP

GILMAN S. STANTON
New York City

FOR forty-one years connected with the American Museum of Natural History, Louis Pope Gratacap was dean of its many curators. His sudden death, on December 19, 1917, found him still the active and valued head of the departments of mineralogy and conchology.

Born in Brooklyn, New York, November 1, 1850, his parents soon thereafter located at West Brighton, Staten Island, where until his death he lived in the family homestead with his elder brother, Thomas Benton Gratacap. Their father, John Louis Gratacap, was of French descent and their mother, Lucinda Benton, whose brother, Pope Benton, contributed to Louis' name, was of a well-known New York family of English ancestry.

Graduating from the College of the City of New York in 1869 with the degree of A.B., he received an A.M. from his alma mater eleven years later. In 1870 he studied at the General Theological Seminary for a year but soon gave up his plans for the ministry His first position was with the National Park Bank, but even advancement failed to hold him in an uncongenial field. He accordingly studied at the School of Mines of Columbia University, from which he obtained the degree of Ph.B. in 1876. He then became chemist for a gas company, which took but part of his time and left him free to study, and join in the commencement of the American Museum with which he became formally associated in 1876. About 1886 the writer, then a boy student of minerals, first met Mr. Gratacap while visiting the Museum. At that time, he was assistant to R. P. Whitfield, of the department of geology, and the fossils required most of his attention. About 1890 Mr. Gratacap was made curator of mineralogy, to which later was added conchology, and his development of these collections then commenced.

The gift by J. Pierpont Morgan, of the Bement Collection and the Tiffany Gem Collection, and their incorporation with that of the Museum, made the collection in Mr. Gratacap's care one of the finest in existence. His skill in arrangement and his judgment in the choice of display specimens enhanced the collection's beauty and its value to students. The extent of these collections required a great amount of labor in installation and cataloging, most of which was done by Mr. Gratacap himself. When to this was added the work on the large collection of shells one wonders how he could possibly have accomplished so much so well. Yet all was done correctly and expeditiously, for his knowledge was accurate, his work conscientious, his industry tireless.

That he made a study of museums and museum display is evidenced by four or five comprehensive articles on this subject written by him. Despite many calls upon his time he was courteous and helpful to all inquirers, were they school children or scientists, and no question, however simple or difficult, was ever inadequately answered. As he modestly refrained from any exhibition of knowledge, one had to probe in many directions to discover the surprising depth of his information.

Tho his work at the Musuem was prodigious and his daily journey from and to his home occupied more than three hours, his time while travelling and at home was spent in varied, tho mostly serious reading, study and writing, partly evidenced by his many and divers articles, pamphlets and books. He had no personal collections except of books; his fine library was as comprehensive as his broad knowledge.

The following partial bibliography will indicate his versatility. His theological books were his earliest, the third having been written years before it was published. "Philosophy of Ritual-Apologia pro Ritu," 1887; "The Analytics of a Belief in a Future Life," 1888; "The World as Intention," 1905; and "The World's Prayer," 1915. They show a religious spirit, wide reading and extensive knowledge of philosophy, theology as well as of natural science. Always a good citizen and believing it everyone's duty to further good government, he wrote "The Political Mission of Tammany Hall," 1892; "Protection a Reasonable Doctrine," 1892; "A Silver Catechism," 1894; "The Political Mission of Reform," 1895; and "Why the Democrats Must Go," 1914.

His "Geology of the City of New York," in the first edition of 1901 containing only 82 pages, is in its third edition of 1909 a valuable work of 232 pages. His "Popular Guide to Minerals," 1912, 330 pages, has also 74 photographic plates of notable specimens in the Bement Collection. The text is an example of the author's ability to present the salient features of a subject in a clear and often novel way.

Apparently as a diversion, for he took but little interest in their distribution, Mr. Gratacap wrote and published some books of fiction, among which were: "The Certainty of a Future Life in Mars," 1903; "A Woman of the Ice Age," 1906; "The Evacuation of England," 1908; and "The New Northland-Krocker Land," 1915. All these were pseudo-scientific fiction, well exhibiting his general scientific knowledge. His "Mayor of New York" and "Benjamin, the Jew" were novels, the latter with many passages of Hebrew, showing the author's care in details. His "Substance of Literature," 1913, shows the extent of his reading in other fields. Then came the great war, inspiring in 1915 the serious "Europe's Handicap—Tribe and Class," and in 1917 the last of his books to be published, a bit of fantastical fiction, "The End—How the Great War was Stopped."

Others in manuscript were awaiting publication, including one on cremation, and his last manuscript, a 10,000-word tribute to Abbé Haüy, written at high speed for the 175th anniversary celebration of that savant's birth.[1]

With all his knowledge and study he was ever interested in everybody and everything. Always ready to help the humblest, beloved by all who knew him, cheering the discouraged, helping the sick and unfortunate often to his own inconvenience, devoting his time to folk who had no claim upon him, ready with a helping hand or good cheer to brighten his corner. His modesty made him reserved, but once intimate his friendship and enthusiasm knew no bounds. He could accommodate himself to any company, so that many never suspected the extent of his learning, the depths of which few dared to probe.

He was fond of music, especially of opera, and was a good pianist. The writer has often heard him play, handicapped by a piano of his ancestors. The theater also appealed to him from his youth, when as an amateur he played Hamlet, until his death. Indeed he was buried on the day he had planned taking his assistant to a matinee.

His modesty seldom permitted him to lecture, but the writer well remembers his lecture on his trip to Iceland, given at the American Museum. It was most polished, and his voice and delivery were charming. Perhaps he was at his best in his speeches to his C. C. N. Y. fellow-alumni. The writer was fortunate in hearing two and they were perfect gems of oratory. But he could seldom be urged into the limelight, for he belittled himself and, it often seemed, overrated others.

To have known Louis Pope Gratacap is to have been blessed with an example of one true to the highest ideals of duty and with unselfish devotion to the inspiration and encouragement of others. Unhandicapped by his modesty, his bachelordom, a generosity large for his income, and a devotion to his not easily accessible home, he would perhaps have shone even brighter.

Fond of travel, of people, of the quaint and the old, he enthused not only about distant things, but about his own old New York, its Greenwich Village, its St. John's Park and its old Trinity Churchyard where his body now rests, a stone's throw from that Broadway-Wall Street maelstrom of his beloved city.

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[1] To be published in the Haüy celebration number of this magazine (June, 1918).

THE LOUIS P. GRATACAP MEMORIAL MEETING OF THE NEW YORK MINERALOGICAL CLUB.

Thus announced, the first meeting of the club for 1918 was held at the American Museum of Natural History on January 16. Dr. George F. Kunz, the President, was in the chair and 16 members and 17 guests present.

In the museum foyer adjoining the entrance to the meeting room a case had been provided in which was displayed a loan collection of books and pamphlets comprising most of those written and published by Mr. Gratacap during his active life.

When the meeting came to order the first part of the evening was devoted to a review of the life and work, and to personal reminiscences of the late L. P. Gratacap, who died suddenly on December 19, 1917. Mr. Gratacap and the President, Dr. Kunz, were among the associates who instituted the N. Y. Mineralogical Club in November, 1886, and organized it in June, 1887; Mr. Gratacap was at that time elected curator of its collections, an office he still held at the time of his death.

The President presented a detailed and extremely interesting resumé of the achievements of Mr. Gratacap, following which many of those present contributed expressions of regret at his demise and related interesting personal reminiscences of him.

Among the speakers were Mr. Gilman S. Stanton,[1] Mr. Lazard Cahn, Mr. George E. Ashby, Mr. Frederick I. Allen, Mr. David J. Atkins, Mr. Albert Operti, and the Secretary. Mr. Stanton, who attended Mr. Gratacap's funeral services as a representative of the Club, stated that his remains were interred in Old Trinity churchyard, midway the south side of the church, in the heart of the business section of New York City. Messrs. E. O. Hovey, D. J. Atkins, L. Cahn, and H. S. Williams were among other members of the Club present.

Wallace Goold Levison, *Secretary*

HOW TO IDENTIFY BAUXITE.—A rather novel way to recognize bauxite—which is a colloidal aluminium hydroxide mineral—is described in "Bauxite and aluminium in 1916," in the *Mineral Resources of the United States*, by James M. Hill.

"Some measure of the relative quality of dried bauxite can be had by grinding a sample in an agate mortar for half a minute. A bauxite of good grade will be found hard to grind and will stick to the mortar with such tenacity that it will have to be scoured out; a poor bauxite or bauxite-clay will grind much more easily and will stick very little if at all; and clay or kaolin grinds with ease and does not stick to the mortar. Similar results are found if the sample is rubbed on glass; the glass will not be scratched by even high-grade bauxite."

We have confirmed the usefulness of this simple test. The streak made by drawing a piece of bauxite across a sheet of glass is surprisingly difficult to erase, while clays of similar aspect yield a powdery line which can be practically all blown away.

CONTRIBUTIONS WANTED.—We hope that our readers will send in notes similar to the preceding one occasionally. We have on hand plenty of manuscript of long articles, enough, in fact, to last until next September; but more brief notes, as well as contributions to the "Famous mineral localities" series, are greatly desired. If you have made any new finds, discoveries, observations, etc., of general interest, let us know about them. Even if you are unable to put the matter into finished form, send an outline anyway, and we will see that it is properly arranged for publication. The Editors.

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[1] Mr. Stanton's article is published in full in this number. Other biographies of Mr. Gratacap will be found in the *Am. Mus. J.*, April, 1918, and *City College Quart.*, **14**, 1, March, 1918.

ULEXITE FROM LANG, CALIFORNIA

WILLIAM FOSHAG

Riverside, Calif.

THE minerals of the colemanite deposits at Lang have been described by Prof. Eakle,[1] as comprising colemanite, howlite and calcite. During the summer of 1916 the writer visited the locality and had his attention called to the ulexite. The association of ulexite and colemanite seems never to have been noted before and because of the light it may shed upon the origin of the colemanite, a short description seems desirable. Unfortunately the significance of the association of the two minerals was not realized at the time of the visit, and little study of their exact relations was made.

The material was collected in the main stope of the Sterling Borax Co. mine near the footwall, where it occurred in considerable quantities. It differs in appearance somewhat from the "cotton-ball" variety, being more compact and lacking the usual loose fibrous structure. It is fibrous more in the manner of satin spar, except that the fibers lie in all directions. The luster is satiny, color white, H. 3.5, a decidedly greater value than that ordinarily assigned to the species. The surface is botryoidal, resembling that of the associated howlite. The internal structure, however, serves to differentiate between the two, the howlite having a compact, porcelain-like structure.

Before the blowpipe the mineral gives all the reactions for ulexite—yields water, fuses at 1 with intumescence, colors the flame deep yellow. A partial analysis gave: B_2O_3, 43.13, CaO, 14.14, H_2O, 35.68, Na_2O (by diff.), 7.05; sum 100.00 per cent.

A critical study of this deposit would probably clear up some of the problems concerning the origin of colemanite. Professor Eakle regards the Lang deposits as being formed by the action of boric acid solutions upon marl. The occurrence of ulexite in such large amounts seems to indicate some sort of lake deposit, ulexite being typically a mineral of the saline residues of the desiccated lakes of the western United States and South America. It is possible that the colemanite was derived from the ulexite by the action of alkaline chloride solutions, a synthesis performed by Van't Hoff. The waters of the streams are decidedly alkaline in the vicinity of the deposits, and the stream beds become coated with incrustations of various salts. The exact nature of the waters, however, has never been investigated.

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[1] *Univ. Calif. Publ., Bull. Dept. Geol.* 6, No. 9.

FAMOUS MINERAL LOCALITIES. 4. THE JOPLIN DISTRICT

A. C. HAWKINS AND E. T. WHERRY

Houston, Texas, and Washington, D. C.

JOPLIN, Missouri, is so famous as a source of fine mineral specimens that practically all introduction may be dispensed with. This article will be devoted to telling something about the writers' experiences during brief visits in 1917, for the benefit of other collectors who may be planning a trip to that district. It may be stated at the outset that unless at least two full days can be spent there the trip is likely to be a disappointment, and, indeed, a week would not be too much to allow if any extensive collecting is anticipated.

The city of Joplin lies in the southwest corner of the state of Missouri, and can be reached by an overnight trip from St. Louis, the best route (in 1917) being the Frisco, altho the M. K. & T. R. R. also has thru service, and branches of several other railroads run there. Another route is that from Kansas City, which requires about 7 hours. From Joplin the various groups of mines can be reached by trolley, local train, or auto.[1]

In many mining districts the dumps of old workings yield a rich harvest to the specimen hunter, but in this region the old dumps are in general about as prolific in minerals as a sand dune. Most of them, first made in the days when low-grade ore did not repay working, have been since dug up bodily, run thru the mills, and made to yield up their metal content; and then the chats or tailings, consisting of finely crushed chert and calcite, have been piled up where the old dump stood. In many mines in other regions there are picking tables or something corresponding, where with the kind permission of the superintendent the mineralogist can hope to rescue a crystal or two, but here practically everything that comes out of the ground is dumped at once into the crusher and lost to science forever.

A number of the mines just to the west of the city, however, have only begun their attack upon the original dumps, and here, in a section readily accessible by trolley or even on foot, via Gray Avenue, on which the crystal cave described below is located, are many thousands of cubic yards of cherty rock in huge irregular masses; much of this is brecciated and filled locally with good ore and crystallized calcite, affording fair specimens, especially for those interested in samples which show geologic phenomena and principles of ore deposition. One dump was found to consist largely of crystallized calcite, much of it in the form of bruised and battered crystals a foot or two in diameter;

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[1] Information as to location of mines, geology, etc., may be obtained from the *Joplin Folio* (No. 148) and from *Bulletin* No. 606, both issued by the U. S. Geological Survey.

these afforded some very fine nearly transparent cleavages of an amber color, with purple phantoms inside them.

It is advisable, in the Joplin district, to do one's collecting largely underground, down in the mines themselves. Permission can usually be readily obtained from the superintendent or other official, and the mineralogist can then make friends with the shift boss or foreman, and will soon see more crystallized specimens of sphalerite, galenite, calcite, etc., than he probably ever dreamed existed. Most of the ore occurs as a replacement of a shattered stratum of white chert, which lies practically horizontal, so that there is usually but one level, the whole bed being mined out, leaving a few pillars here and there. The ore-bearing stratum is very porous, with openings of all sizes up to many feet in diameter, and the walls of these caverns are studded with crystals of the various minerals for which Joplin is famous. Many are of course ruined by the blasts, but in protected places they may be untouched, and by the use of a hammer and chisel almost any sort of specimen desired can be obtained. Paper and packing boxes should be procured before going down the mines, as the minerals are comparatively soft and easily damaged if dumped without wrapping into a collecting bag. The miners have peculiar terms for the various minerals—tiff for calcite (or anything else, such as dolomite and barite, showing light color and cleavage); mundic for pyrite or marcasite; jack for sphalerite; etc.

After exhausting the possibilities of the mines in the vicinity of Joplin, visits may well be paid to Cartersville and Webb City, Missouri; Galena and Baxter, Kansas; and Miami and Picher, Oklahoma, all of which places are within an hour's ride of Joplin itself. It will be well to inquire on arrival in the city as to any new regions being developed, for new workings often yield fine specimens.

Finally, the remarkable "crystal cave" in the outskirts of Joplin, near the western end of Gray Avenue, deserves mention. It is a cavern some 200 feet wide, 800 feet long and 20 feet high, with walls thickly studded with enormous calcite crystals. The crystals are rhombohedrons modified by flat scalenohedral faces, and are mostly dull yellow in color. They are flattened in growth in a plane parallel to the rock wall to which they are attached. Many of them are 2 feet long and a foot in thickness, and show phantom growths within them outlined by layers of tiny bright marcasite crystals or zones of a rich purple color. Unfortunately their softness has led to some disfigurement of those within reach of the initial-carving public, but a considerable number are undefiled. Mr. A. C. Roach, who owns the cave, has fitted it with stairways and electric lights, and the mineralogist should certainly allow an hour or two for a visit to this unique occurrence.

PROCEEDINGS OF SOCIETIES

New York Mineralogical Club

Meeting of January 16, 1918

Part 2: Exhibition of Luminescent Minerals

In the meeting room at the left of the platform by a round table was a mercury-vapor arc lamp, called a "Sun Lamp," provided and operated by Messrs. I. J. Allen and F. W. Robinson, representatives of the Hanovia Chemical and Mfg. Co. of Newark, N. J. Preceding the meeting the early arrivals surrounded the instrument and tried its effect on specimens of willemite, etc., they had brought with them, including several cut gems. The greenish-yellow color of the gem variety of willemite was shown by this light as by sunlight, and it vividly excited a residual glow in certain willemites and other sensitive substances.

Upon the conclusion of the Gratacap memorial proceedings, the President announced that Dr. G. Failla of the Memorial Hospital had brought to the meeting a tube containing radium which would be experimented with. It consisted of a capillary glass tube sealed at both ends, about 1/8 inch outside diameter and perhaps 5/8 inch long, containing radium emanation, and was retained in the sealed end of a larger tube by a plug of cotton. In the dark it was visible to the entire assemblage as a faint luminous glow. On approaching it to specimens of sensitive willemite it excited the usual green fluorescence of the mineral, vividly when near it and distinctly even at distances of several feet.

A letter was then read by the Secretary from Mr. W. S. Andrews of the General Elec. Co., Schenectady, N. Y., accompanying specimens of luminescent products made by him and offered for exhibition at the meeting. These were a zinc silicate (called artificial willemite) and cadmium phosphate, both fluorescent; and a triboluminescent zinc sulfide. Dr. Kunz then exhibited several choice mineral specimens from the Museum collection which after exposure to the quartz lamp or to radium showed very strong residual luminosity, among them willemite and fluorite.[1]

Mr. George E. Ashby then read a letter from Mr. George L. English, of Ward's Nat. Sci. Establishment, presenting for exhibition a large specimen of the triboluminescent sphalerite from the Horn Silver Mine, Frisco, Utah, and several small specimens for distribution among the members with his compliments.

Mr. J. P. Wintringham exhibited a similar large and highly responsive specimen of willemite which afforded a brilliant afterglow and showed the blue fluorescence of a small crystal of fluorite, the mineral in which the phenomenon was first observed and from which its name was derived. He read from a textbook of mineralogy the customary description of phosphorescent and fluorescent minerals.

Commenting on the general subject the Secretary remarked that on various early occasions and especially lectures of October 13, 1898, and February 8, 1900, before the Brooklyn Institute, published in the daily papers, and a paper for the N. Y. Acad. of Sciences read December 5, 1898,[2] he had defined fluorescence and phosphorescence as step-down and step-up transformations, and fluorescent and phosphorescent substances as step-down and step-up transformers, of radiant wave energy, because the former transform incident wave energy to energy of longer wave-length and the latter to rays of shorter wave-length, although its refrangibility is usually altered only a few steps from the upper or lower to the middle registers of the spectrum. He pointed out also that the prevailing impression that the excitation of fluorescence is confined to the ultra-violet rays, resulting from incomplete explanations of the action of the spark gap light, is unwarranted, as most of the many sensitive substances now known will respond quite as well to one or another of the rays of the visible spectrum, especially those above the yellow-green. It was with sunlight after transmission through a train of glass lenses and prisms that he had discovered the direct fluorescence and afterglow of the Franklin, N. J., willemite in 1898.[3] Conversely neither should the development of phosphorescence be considered as exclusively confined to the infra-red rays, as in some substances it may be excited within the visible spectrum.

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[1] These had been described by him in several papers, especially: On the triboluminescence of pectolite as distinguishing it from the zeolites. *Annals N. Y. Acad. Sci.*, April 20, 1876; The action of radium, actinium, Roentgen rays, and ultra-violet light on minerals and gems (in collaboration with Professor Charles Baskerville). Presented before the New York Academy of Sciences. Oct. 6, 1903.

[2] On a system of classification of fluorescent and phosphorescent substances. Abstract in *Annals N. Y. Acad. Sci.*, (5), **40**, Pt. 3, pp. 496–497, Dec. 31, 1898.

After some further discussion of the subject the meeting adjourned, but many of those present lingered to try further experiments with the various exhibits.

Wallace Goold Levison, *Secretary*

The Philadelphia Mineralogical Society

Wagner Free Institute of Science, February 14, 1918

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the President, Dr. Leffmann, in the chair. Eighteen persons were present.

Dr. Herman Burgin made an interesting communication on "The Early History of the Anthracite Industry in Pennsylvania." Mr. Trudell read an account of a mineralogical trip around Philadelphia taken by Mr. Theodore Rand fifty years ago (1867).

Samuel G. Gordon, *Secretary*

NEW MINERALS

Mullanite

On mullanite, a new member of the jamesonite group, from two localities. Earl V. Shannon. *Am. J. Sci.*, [4], **45**, (1), 66–70, 1918.

Name: After Capt. John Mullan, for whom one of the localities, Mullan, Idaho, was named.

Physical Properties

Color: steel gray, sometimes darker when tarnished; luster: metallic to metallic-adamantine; opaque; streak: brownish black; form: long parallel fibers; friable; fine matted wool-like masses. $H = 3.5$. Sp. Gr. = 6.407.

Crystallographic Properties

Orthorhombic. Forms: *a* (100), *b* (010), *c* (001), *m* (110), *r* (120), *β* (510), *n* (130), *t* (140). Habit: prismatic-fibrous; deeply striated and somewhat flattened parallel to the front pinacoid. Cleavage: *c* (001) and *b* (010) distinct, *a* (100) and probably *m* (110) imperfect. Thin fibers are flexible, thick ones brittle.

Chemical Properties

Composition: $5PbS.2Sb_2S_3$. Analysis (average of 2) of material from Iron Mountain Mine, Superior, Montana: Sb 25.71, Pb 55.05, S 18.82, As 0.25, Cu none, Fe trace; sum 98.81.

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[3] Levison, W. G., On a simple and convenient phosphoroscope (Read N. Y. Acad. Sci., April 4, 1898.) *Annals N. Y. Acad. Sci.*, (5), 40, No. 17, pp. 401–403, Sept., 1898.

OCCURRENCE

In hydrothermal veins, intimately associated with sphalerite and epiboulangerite (from which it may be distinguished by its streak), quartz and siderite, at the Gold Hunter Mine, near Mullan, Idaho, and the Iron Mountain Mine, near the town of Superior, Montana.

S. G. G.

ABSTRACTS OF MINERALOGIC LITERATURE

THE ORIGIN OF METEORITES. FRIEDRICH BERWERTH. *Smithsonian Rept.*, **1916**, 311–320. A translation from a lecture before the Sci. Club of Vienna, Jan. 26, 1914. Reviews the various ancient and modern theories of physicists, chemists, mineralogists and astronomers of the origin and source of meteorites. Concludes that the arguments indicate them to be broken bits of a world body destroyed by volcanic events, but still retained within our solar system and that their stellar origin or arrival from strange worlds is improbable.

W. G. L.

WOOD–TIN IN THE TERTIARY RHYOLITES OF NORTHERN NEVADA. ADOLPH KNOPF, U. S. Geol. Survey. *Econ. Geol.*, **11** (7), 652–661, 1916.

The form of cassiterite known as wood-tin has been found here in place, associated with specularite (hematite) and various forms of silica. The evidence indicates that the tin dioxide was deposited as a gel, its structure being due to rhythmic precipitation. E. T. W.

THE GEOMETRICAL RELATIONSHIPS OF ISOMORPHOUS MIXTURES; APPLICATION TO THE RHOMBIC AND MONOCLINIC PYROXENES. A. LEDOUX. *Bull. soc. franc. min.*, **39** (8), 232–280, 1916.

A discussion of the topic axes or molecular distance ratios of the fundamental silicates of the pyroxene group. E. T. W.

ZEOLITES AND ASSOCIATED MINERALS FROM THE TERTIARY LAVAS AROUND BEN MORE, MULL. W. F. P. M'LINTOCK. *Trans. Roy. Soc. Edinb.*, **51**, I, 1–33, 1916; thru *Chem. Abstr.*, **11** (13), 1939–1940, 1917.

The occurrence and origin are discussed of scolecite, epidote, prehnite, garnet, albite, hornblende, calcite, chabazite, thomsonite, chlorite and stilbite. Several analyses and photographs of specimens are included. E. T. W.

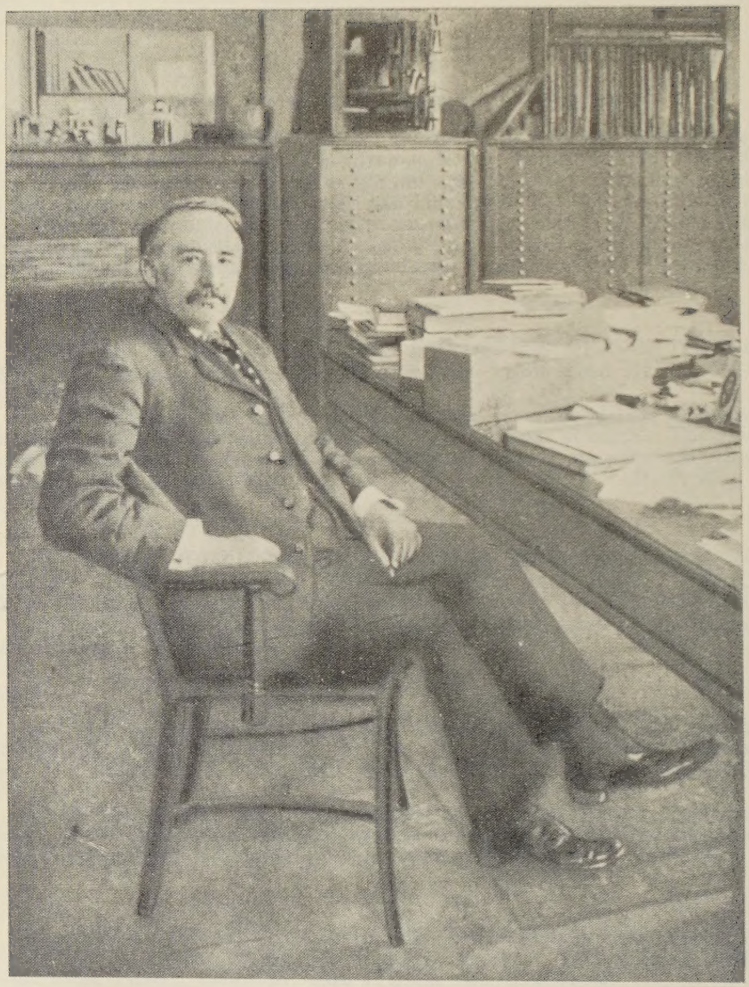
SIMULTANEOUS SEPARATION OF TWO FORMS OF SILICIC ACID FROM THE SAME SILICATE. GUSTAV TSCHERMAK. *Sitzb. Akad. Wiss. Vienna*, **1916**, 125; thru *J. Chem. Soc.*, **112**, II, 30.

Forsterite and ilvaite when treated with acids yield silica of varying composition, depending on the strength of the acid. Possible theoretical reasons for this are discussed. E. T. W.

EXCHANGE NOTICE.

W. T. Watkin Brown, Bown's Road, Kogarah, New South Wales. Typical Australian minerals offered in exchange for any American minerals except Paterson zeolites, of which enough have already been received.

PLATE I



LOUIS POPE GRATACAP

1850–1917